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Searching for the meadow viper in Romania

by
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Abstract: During a one week trip to Romania, certain meadow viper localities were visited in August 1996. A former *Vipera ursinii rakosiensis* biotope in Fînaţele Clujului gave no further evidence for the occurrence of the subspecies, whereas a two-day survey in the Danube Delta (Sf. Gheorghe) was more successful: two male *Vipera ursinii* cf. *renardi* specimens were found, measured, photographed and blood-sampled for later analysis. Morphology of the two specimens is compared with literature data of the other forms in the meadow viper species group. A detailed habitat description is given for the two localities, as well as some herpetofaunal observations collected during the trip.

Key words: *Vipera ursinii rakosiensis*, *V. u. moldavica*, *V. u renardi*, localities in Romania, Danube Delta, habitat description, morphology, taxonomy

Introduction

Occurrences of different forms of the meadow viper species group in Romania are mentioned from Transylvania (Méhely 1894, Stugren 1955, Vancea *et al.* 1985), Moldavia (Băcescu 1941, Fuhn & Vancea 1961), and the Danube Delta Region (Băcescu 1937, Fuhn & Vancea 1961, Stugren 1961, Vancea *et al.* 1985).

In Transylvania only one former locality is known near Cluj-Napoca, and since there was no record of occurrence in the past 25 years the meadow viper is most probably extinct here (Vancea *et al.* 1985). The Moldavian territories include the north-eastern border zone of Romania with the former Sovietunion, and an independent republic (Moldavia proper) now completely landlocked by Ukraine. Populations of the meadow viper, described as a separate subspecies, *V. u. moldavica*, by Nilson *et al.* (1993) once dispersely inhabited the low (ca 200 m a.s.l.) hills and valleys of the area. In the county of Iaşi, on the meadows of Romîneşti (Avîntul, Ursoaia) and Tomeşti the vipers occupied characteristic steppe biotopes (Băcescu 1941, Vancea *et al.* 1985). In the county of Botoşani, two localities are mentioned in the literature, in the surroundings of Horlăceni (close to Şendriceni-Dorohoi) and Călăraşi (Vancea *et al.* 1985). In 1988, only one locality (Valea lui David) was known to survive about 5-6 km northwest of Iaşi (Nilson *et al.* 1993). The meadow on the north-western slope of the hill La Coşari was once about 80 hectares (Vancea *et al.* 1985), but has been enclosed among agricultural fields and its size decreased dramatically (Andrén & Nilson 1994). The survival of the population became dubious today.

There is one more peculiar record of *Vipera ursinii* caught on Mt. Rărău (Vancea *et al.* 1985). The unique specimen, formerly preserved in the County Museum of Iaşi, was unfortunately lost, but most probably represented an isolated population of *V. u. moldavica* that occurred previously in the lower hills of the Carpathian Mountains as well (Nilson *et al.* 1993).

From the Danube Delta there are a number of former records of the meadow viper mentioned in the literature (Letea, Caraorman, Sărăturile Sfîntului Gheorghe by Kiss 1985, Periprava, Periteaşca and Portiţa by Vancea *et al.* 1985), although the present status is almost all uncertain. In addition, despite several taxonomic evaluations, the rank of the form living here is still not clarified.

The aim of our trip was to study the habitat relationships of the meadow viper forms relative to the Hungarian subspecies (*Vipera ursinii rakosiensis* Méhely, 1893), to collect information and make comparison of the ecological demands of the different populations. Trying to find the reasons for the extinction in the Fînaţele Clujului and the survival in the Danube Delta, we hope to work out a more effective protection.

Results

1. Hayfields at Cluj

The locality visited by us on the 10th of August 1996 has the geographical co-ordinates 47° 03' 42" N and 21° 56' 04" E (defined by a Magellan GPS-3000 apparatus), and lies about 375-385 m a.s.l. (450 m according to Vancea *et al.* 1985). The area is about the size of 2.9 hectares, protected as a botanical reserve because of the occurrence of endemic plant species (*Astragalus exscapus* ssp. *transsilvanicus, Thymus dacicus*). It is still traditionally managed as a hayfield, divided by loess hills and temporary ravines (Fig. 1). The vegetation is

Fig. 1. Hayfields of Fînaţele Clujului, a former meadow viper locality near Cluj-Napoca, Central Transylvania

described as a *Stipetum* or *Stepion lessingianae* steppe association (Csűrös 1974, Vancea *et al.* 1985), and its structure is somewhat similar to the Hungarian meadow viper habitats (*Stipa* sp. is also a characteristic plant there). Intense mowing and grazing, however, disturb it, and make it as a potential biotope with very low probability. The area is still interesting for botanists (Csűrös 1974), with characteristic and rare Continental (*Stipa lessingiana, Nepeta ucranica, Serratula wolfii, Adonis volgensis*) and Pontusian plant species (*Iris humilis, Centaurea trinervia, Bulbocodium vernum*). The last meadow viper specimen was found in 1971 by István Péterfi (1906-1978), the noted botanist, whose name is also immortalised by such endemic plant species as *Astragalus péterfii*. The skin of the animal was preserved as a bookmark in one of the volumes of the family library, and is possibly still kept by Leontin-István Péterfi, son of the botanist.

During our survey, a male smooth snake (*Coronella austriaca*) and a juvenile green lizard (*Lacerta viridis*) were found, together with numerous praying mantises (*Mantis religiosa*) and saddle-backed bush-crickets (*Ephippigera ephippiger*). In conclusion, it can almost certainly be stated that this locality, despite its relatively protected status, has little importance regarding both the survival and/or reintroduction of the meadow viper.

Continuing our trip, having crossed the River Danube at Galaţi we had a short stop at the Pricopan chain of the north-western part of Mts. Măcin. A confiscated specimen of *Elaphe quatuorlineata sauromates* was released here, which is the habitat proved recently for this rare subspecies believed to have disappeared from the Romanian herpetofauna some twenty years ago (Török 1996a). A short survey was made in the quarry nearby, which is also the habitat for such reptiles as *Testudo graeca ibera* and *Lacerta trilineata*. A completely light brown specimen of *Podarcis taurica* was caught, too, which resembled us very much to the Bulgarian *Podarcis erhardii*.

2. Danube Delta

The Danube Delta Region (situated in North Dobrogea) is the estuary of the river at the Black Sea and characterised by three main arms of the Danube: Chilia, Sulina, and Sfîntu Gheorghe. The only major settlement in the remote part is Sf. Gheorghe, which can exclusively be reached from Tulcea in five hours by boat. The river mouth in the northern part, at Chilia secondary delta have a yearly growth of 40-80 m increase of alluvial deposits in average, while the withdrawing of the shore due to the rising of the sea level is about 3,7-17,5 m/year. Among the three arms, Sfîntu Gheorghe is the longest (originally 108.2 km, but has been shortened by six meanders to 69.7 km).

The whole Danube Delta Region (an area of 5912 km^2) was declared as a Biosphere Reserve by the Romanian Governmental Decision No. 953 and 983/27.08.1990 (art. 5). It includes 18 strictly protected areas (525.8 km^2), 2302 km^2 buffer zones, 255 km^2 areas proposed for ecological restoration, and 2829 km^2 areas with traditional economic activities. The managing authority of the reserve includes a guard corps, a research body, and an environment quality survey group. There is a whole network of tourist organisation lines and travel companies arranging the necessary reservations for the visitors. The majority of the remote areas (even the picturesque fishermen's village Sf. Gheorghe) can only be visited with special permissions. A specially equipped and very effective Ecological Warden Group has been organised by the proposal of J. B. Kiss, and provides the natural conservation control for the whole area.

Fig. 2. Meadow viper habitat Sărăturile Sfîntului Gheorghe, Danube Delta Biosphere Reserve

The Danube Delta is famous for its very dense bird populations (ca 320 species), of them especially prominent are the last European white pelicans (*Pelecanus onocrotalus*), white-tailed eagles (*Haliaëtus albicilla*), and huge colonies of grey, purple and squacco herons (*Ardea cinerea, A. purpurea, Ardeola ralloides*), spoonbills (*Platalea leucorodia*), white and little egrets (*Egretta alba, E. garzetta*), cormorants (*Phalacrocorax carbo*), glossy ibis (*Plegadis falcinellus*), etc.

In the Danube Delta, once the region surrounding Letea was considered as "classic" viper locality (Kiss 1985), but in the last decades it was drawn under agricultural activities similarly to Fînaţele Clujului and Iaşi. The herpetofauna of this region is now most probably extinct. Apart of the population near Sf. Gheorghe, meadow viper was also mentioned from Periteaşca and Portiţei (Vancea *et al.* 1985), but during a recent survey the snake was found only in Periteaşca (13 specimens have been observed along two transects, Török 1995a). This population is situated on the coast and almost inaccessible. It was also impossible for us to visit the area.

North of Sf. Gheorghe, a village with about 1000 inhabitants, there is an area of several hectares (Sărăturile Sfîntului Gheorghe) divided by old poplar plantations, which provide suitable habitat for a population of *Vipera ursinii* (for taxonomic implications see Discussion). Though once fenced by the state forestry it is not a strictly protected area but belongs to the buffer zone of the nature reserve lying south of the Sf. Gheorghe arm of the Danube. It is considered as one of the safest localities of the meadow viper in Romania (Kiss 1985). The sandy grassland is divided by several hundred meter wide planted poplar (*Populus alba*) strips. The larger parts are divided by old ditches (with reed, *Phragmites*

communis), and the whole area is about 1 km from the coast of the Black Sea. The meadows are bordered by sea buckthorn (*Hippophaë rhamnoides*), tamarisks (*Tamarix ramosissima*) and black locust (*Robinia pseudacacia*) bushes, and have a tussock vegetation of *Salix repens*, *Euphorbia sequeriana* and *Stipa* sp. Characteristic plant species are, in addition, sea lavender (*Limonium gmelinii*), salt-marsh (*Salicornia herbacea*), and bindweed (*Calystegia sepium*). The most important tussock building grass is maritime rush (*Juncus maritimus*), which provides a vegetation structure very similar to the Hungarian meadow viper habitats (Fig. 2). It takes over the role of *Schoenus nigricans* in the drying fen meadow (*Molinietum: Molinia coerulea, Schoenus nigricans, Chrysopogon gryllus*) plant association on the Hungarian Great Plain (Újvári & Korsós 1997). The vipers obviously use the stalk of the *Juncus* as a hiding refuge, which also keep them at the proper temperature during the very hot daily hours. A tussock serves as a night shelter as well. We did not see any small mammal burrows, but plenty of grasshoppers, crickets and lizards live in the area. They form the food base of the viper population. According to a study by Kiss (1985), four specimens of the grasshopper *Calliptamus barbarus* were found in a *Vipera ursinii renardi* stomach. The commonest lizard in the area is *Lacerta agilis euxinica* Fuhn & Vancea, 1964 (Kotenko *et al.* 1993, = *L. a. chersonensis* sensu Bischoff 1984), adult specimens of which were also active during the hottest daytime.

Fig. 3. Meadow viper, specimen 1, from Sărăturile Sfîntului Gheorghe, photographed in the field on 12th of August, 1996

During the two days spent in the area 5 hedgehogs were seen (*Erinaceus concolor*), so we assume that this carnivorous mammal can play an important role as a predator of the vipers. They were especially active during the warm late afternoon hours (7-8 p.m.), which was also the best period to find the vipers moving around in the habitat. According to Kiss (1985) birds such as herons, corvids, shrikes, roller (*Coracias garrulus*), and the introduced pheasant (*Phasianus colchicus*) present the most important danger, and may be responsible for the decline of the viper populations at least in some parts of the Danube Delta.

Searching for the meadow viper proved to be similarly hard and difficult work in Romania as in Hungary. During the two days, despite of the expectations of Zs. T., we managed to capture only two adult male specimens, both collected at almost sunset (after 7 p.m.). They were on their way to search for food obviously revived from the resting period in the tussocks during the hot (around 40 °C in shadow) daily hours. The specimens were photographed on the spot (Fig. 3), then carried to our accommodation in Sf. Gheorghe, where measurements, morphological observations, and blood-samples were taken. Both vipers were released intact on their original sites on the subsequent day. Blood samples were stored in liquid nitrogen and are deposited now in the Hungarian Natural History Museum at -50 °C for later analysis.

During short walks from Sărăturile Sfîntului Gheorghe to the coast the following observations were made (Fig. 4). The vegetation changes, becomes scarce with less ligneous plants and lots of open, salty, sandy spots. Between the plant species of sea-holly (*Eryngium maritinum*), saltwort (*Salsola soda*), lyme-grass (*Elymus sabulosus*), bushes (*Hippophaë rhamnoides, Eleagnus angustifolia*), *Centaurea* sp., sea rocket (*Cakile maritima*) and convolvulus (*Convolvulus persicus*) a dense population of the lizard *Eremias arguta deserti* lives on the dunes, which is the only European representative of this Asian lacertid genus (Fuhn & Vancea 1961). Interestingly, this type of habitat seems to be closer to the meadow viper biotope in Periteaşca as characterised by Török (1995b, 1996b).

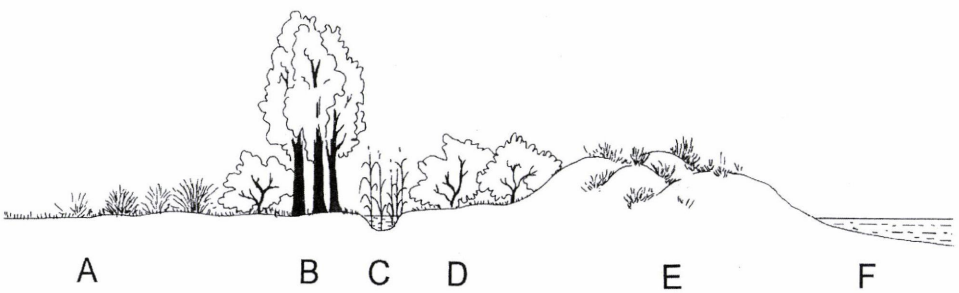

Fig. 4. Vegetation zones in the Danube Delta habitat, Sf. Gheorghe, cross section. Drawn not to scale. A: *Vipera ursinii* meadow (*Juncus maritimus, Stipa nivens, Limonium gmelini, Salicornia herbacea*), B: planted poplar wood (*Populus alba, Eleagnus angustifolia, Hippophaë rhamnoides*), C: ditch (*Phragmites communis*), D: bushes (*Hippophaë rhamnoides, Tamarix gallica, Robinia pseudacacia, Eleagnus angustifolia*), E: sand dune (*Eryngium maritimum, Salsola soda, Elymus sabulosus, Cakile maritima*), F: Black Sea.

3. Morphological data

Morphological data of the two male meadow vipers from Sărăturile Sfîntului Gheorghe are summarised in Tables 1-2. Table 1 shows the characteristic body measurements, where-

as Table 2 compares our morphological data (mainly pholidosis) to those from the literature. Since we have collected two males only, data referring to males were extracted from the literature as well. In some cases (Dely & Stohl 1984, Stugren 1955, 1961), average and standard deviation were not given in the original article, so they were calculated from the raw data. The unique specimen found and described by Băcescu (1941) from Tomeşti is repeated here for the first time, no other references could be traced in the literature.

Scale rows were counted in three places across the body in the case of specimen 1: at 10 cm from the head it was 20, 21 at midbody, and 17 at 10 cm from the tip of the tail. In specimen 2 it was counted at four places across the body: at the 7th scale row the number was 22, at the 35th 21, at the 70th 21, and at the 120th it was 17. Both animal had 4-4 shields (loreals) between the nasale and the periocularia. Frontale of specimen 1 was injured, 1-1 shields were found between the frontale and the supraoculare. Frontale of specimen 2 was intact, with 2 shields on the left side and one on the right, touching the supraoculare.

Both specimens had generally stronger characters than the Hungarian specimens. The head was bulkier, wider at the base, more triangular, and more separated from the neck. Body mass and body length were similar to the largest Hungarian specimens. Coloration was darker, the zigzag pattern on the first male was almost black, there was little difference between it and the bordering black stripe. On the second male the zigzag pattern was more brownish.

Table 1. Body measurements of the two specimens caught at Sf. Gheorghe, Danube Delta

	Body mass (g)	Total length (mm)	Tail length (mm)	SVL (mm)
Specimen 1	51,5	482	60	422
Specimen 2	57,0	557	70	478

Discussion

In Transylvania, the only known locality (Fînaţele Clujului) is situated at the western border of the Transylvanian Basin, about 4 km north of Cluj-Napoca. The meadow viper is first mentioned from here by Méhely (1894, 1895) based on specimens donated him by teacher K. Parádi. Earlier two forms of *Vipera berus* was believed to occur in Transylvania (e. g. Entz 1888) and one of them ("eine schmalköpfige Varietät") proved to be later *V. u. rakosiensis* (described by Méhely in 1893 from the Rákos meadows, south-east of Budapest).

Stugren (1955) describes the specimens from Fînaţele Clujului as belonging to *Vipera ursinii ursinii*, because at that time Méhely's *rakosiensis* was considered a synonym of that. In the same year, however, Knoepffler & Sochurek (1955) revalidated the subspecies *rakosiensis*, and since Kramer (1961) the specimens from Cluj are always listed as belonging to this form (e.g. Fuhn & Vancea 1961). Specimens were very rare of the isolated population already in the 60-ies, and, in spite of the protection of the meadow as a botanical reserve and several surveys carried out by the staff of the University of Cluj-Napoca, no sign of occurrence of the viper was found in the past 25 years.

One more locality is mentioned in the middle of the Transylvanian Basin between the villages Bonţida and Sic by Vancea *et al.* (1985). One meadow viper specimen was photographed here on a pasture with *Stipa* and *Potentilla* sp., but no more detail is available.

Based on recent surveys (1991-1995) carried out by the staff of the Danube Delta Research and Design Institute, Tulcea, three places in North Dobrogea proved to support

Table 2. Selected morphological data (mean deviation and sample size) of different specimens of the meadow viper

	Midbody scale rows	Scale rows on neck	Ventrals	Subcaudals	Supralabials	Sublabials	Loreals Left/Right
Specimen 1 from Sf. Gheorge	21	20	141	38	18	18	4/4
Specimen 2 from Sf. Gheorge	21	22	137	38	18	18	4/4
V. u. rakosiensis x *V. u. renardi* from the Danube Delta	–	–	138.4 ± 2.4 (5)	38.4 ± 1.8 (4)	18.0 (9)	–	–
V. u. renardi from the Danube Delta (Stugren 1961)	–	–	139.0 ± 1.0 (3)	36.3 ± 5.7 (3)	16.0 (3)	–	–
V. u. renardi from the URSS (Vancea *et al.* 1985)	21.0 ± 0.0 (39)	21.3 ± 0.1 (39)	141.8 ± 0.7 (25)	35.0 ± 2.1 (17)	17.8 ± 0.1 (39)	–	4.0 ± 0.7 (10)
V. u. moldavica from Jaşi (Nilson *et al.* 1993)	19.2 ± 0.2 (31)	20.0 ± 0.2 (31)	138.2 ± 0.8 (16)	35.9 ± 2.6 (13)	16.8 ± 0.2 (31)	19.2 ± 0.2 (16)	8.5 ± 0.4* (16)
V. u. moldavica from Tomeşti (Băcescu 1941)	19	19	141	35	18	–	–
V. u. rakosiensis from Finaţele	19.7 ± 1.2 (3)	–	139.7 ± 6.7 (3)	36.3 ± 1.2 (3)	17.0 ± 1.0 (3)	–	–
V. u. rakosiensis from the Kiskunság (Dely & Stohl 1984)	19.0 ± 0.0 (10)	–	134.6 ± 2.6 (10)	32.4 ± 1.4 (10)	16.0 ± 0.7 (10)	16.8 ± 2.2 (10)	2.5 ± 0.7 (10) 2.7 ± 0.5 (10)

* Both side together

viable meadow viper populations: Letea, Sf. Gheorghe, and Periteşaca (Török 1995b, 1996b). All are situated in the Danube Delta Biosphere Reserve, and the first (Letea) is itself a strictly protected area. The planted poplar forests at Sfîntu Gheorghe are managed by the Romanian state forestry, whereas Periteaşca represents a buffer zone around two strictly protected areas. Since 1994, based on the law No. 13/22.02.1993 and the Governmental Decision No. 127/30.03.1994, *Vipera ursinii* has a strictly protected status in Romania.

Comparing only the morphological data, no definite differentiation could be made between the two Sf. Gheorghe specimens and other forms described in the literature (cf. Table 2). The two specimens found by us are closer to the data of *V. u. renardi* in the former Sovietunion, at least on the basis of the average of the number of their ventrals (139). The number of supralabials (18-18) exceeds both those of *renardi* and *moldavica*, and are in exact agreement with the Danube Delta data of Vancea *et al.* (1985). This is also the case with the number of subcaudals, with the addition that all these seem to be differing from the values of the other populations.

It seems that the present specimens from Sf. Gheorghe together with the former data from the Danube Delta form a quite separate group and have significant differences from all other populations. The low number of observations can, however, support only very tentative statements on the taxonomy of these groups of the meadow viper. This is also shown by the divergent, sometimes contradictory opinions in the literature. Kramer (1961) in his revision of the *Vipera ursinii* group considers the Danube Delta populations to be members of the subspecies *renardi*. According to Kramer, and later to Vancea *et al.* (1985), the western basins and southern slopes and plains in Romania were once occupied by *V. u. rakosiensis*, whereas populations in the eastern territories, including Moldavia, represent an intergradation zone between *renardi* and *rakosiensis*. Their opinion taxonomically was not supported by Nilson *et al.* (1993) who described a population in Iaşi, surviving close to the Moldavian border, as *V. u. moldavica*. The populations in the Danube Delta were never studied deep enough to place them properly in the group, the decision was always explained on the basis of very few specimens. Vancea *et al.* (1985) considered them belonging to an intermediate form between *ursinii* and *renardi*, similarly to the Iaşi population. In their explanation, *V. u. renardi* is the evolutionary most advanced member of the group with a geographically wider distribution, and its development even today has resulted in the secondary intergradation zone in Moldavia and the adjacent areas. They also put the contact of the two subspecies in the Danube Delta to an earlier period. Nilson *et al.* (1993), on the other hand, argued in favour of the separate subspecific status, and grouped the Delta populations together with *moldavica*. Unfortunately, no blood-samples were obtained, so they could not include the form into their immunological analysis. Their morphological data, nevertheless, showed great similarity, with a slight individual difference only in the number of midbody scale rows (Moldavian population: 19.2; Danube Delta population: 19.9). According to the immunological results they suggest to consider the *Vipera ursinii* complex rather a composition of sibling species than subspecies. A phylogenetic analysis has given *renardi* the status of a separate evolutionary taxon (Nilson *et al.* 1994). A thorough analysis with new taxonomic implications is soon to be published by Nilson & Andrén (submitted).

To draw the conclusions from our short trip in search for the meadow vipers in Romania, it is obvious that there is not much hope to include Fînaţele Clujului in the present distribution. The population at Sf. Gheorghe in the Danube Delta, on the other hand, deserves special attention, and in spite of the relatively safe environment recently experienced it would

definitely be necessary to put the area under strict protection. Regular surveys have to be carried out in the other regions (Letea, Periteaşca) of the Delta inhabited by the meadow viper. A new survey, study and nature conservation control is needed to protect effectively the only surviving population in Iaşi. As regards the conservation status of the species in Romania, it is encouraging that the meadow viper has been recently added to the list of protected animals (Table 3, Németh 1994). In the future, it is worthwhile to expand the research into the Republic of Moldavia, from where almost no information on *Vipera ursinii* is available.

Table 3. List of the protected amphibians and reptiles in Romania (cf. Németh 1994). Altogether there are 20 amphibian and 25 reptile species included in the herpetofauna of Romania. The meadow viper was added to the protected animals' list after the publication by Németh.

Rana arvalis	*Eremias arguta deserti*	*Coluber jugularis*
Testudo hermanni	*Elaphe quatuorlineata*	*Eryx jaculus*
Testudo graeca ibera	*Elaphe longissima*	*Vipera ursinii*

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